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ABSTRACT

A project sought to produce adequate data on high technology training needs in New Jersey's Middlesex County College's service area. Of 168 individuals at high technology companies who were sent surveys, 52 returned usable surveys. Respondents supplied information on the impact of high technology on the company over the next five years, the company's inhouse education and training practices, outside training sources, and current and future training needs. A computerized database was developed and analyzed to yield results. According to survey respondents, high technology would have a substantial impact. They also indicated that the percentage of professional technical employees will probably increase over the next five years; the need for continuing education and retraining will probably increase over the next five years; higher education needs to play a significant role in satisfying industry's education and training needs; significant current and future training needs are projected; and areas in which there are substantial educational and training needs include computers, robotics, computer-assisted design and manufacturing, automated laboratory techniques, and information management. Areas for future study were recommended. (Appendixes include the instrument and mailing list.) (YLB)

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FINAL REPORT

OF

HIGH TECHNOLOGY TECHNICAL TRAINING NEEDS ASSESSMENT

1983-84

MIDDLESEX COUNTY COLLEGE
EDISON, NEW JERSEY 08818

(201) 548-6000

PROJECT DIRECTOR

DR. FRANK SPANO, DEAN

DIVISION OF ENGINEERING TECHNOLOGIES AND SCIENCE

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
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PROJECT TITLE: High Technology Technical Training Needs Assessment

LEGAL NAME OF APPLICANT DISTRICT, INSTITUTION OR AGENCY: Middlesex County College

ADDRESS: Mill Road

Edison, N.J. 08818

PROJECT DIRECTOR: Dr. Frank A. Spano

TELEPHONE NUMBER: 201 548-6000
(Area Code)

ABSTRACT

DESCRIPTION OF PROJECT

(Use this sheet and no more than one other to type in single-spaced form a statement of project objectives, procedures that were followed, state and local priorities emphasized and the expected contribution of the project to vocational education.)

OBJECTIVES:

(1) To establish a comprehensive data base for area employers, including the names and positions of managers in charge of training, in-house training capabilities, and sources of external training services.

(2) To identify firms in which there is, or will soon be, a need for retraining or hiring of personnel with skills appropriate to the introduction of high-technology into company activities.

(3) To develop, in cooperation with area employers, a projection of the type and skill level and relative numbers of technical employees to be needed in "high-tech" positions over the next 5 years, together with some idea of industry's training needs in order to prepare individuals for these positions.

(4) To disseminate our findings to cooperating employers at a "High Technology Conference" at which their input into our training strategies will be solicited.

Abstract continued

Procedures:

(a) A definition of High Technology was adopted and a survey instrument was developed and mailed to companies identified by our Division of Engineering Technologies and Science to be in the High Tech category. Concurrently, special interviews were held with company officials for further input.

(b) Special conferences November '83, January '84, May '84 were held to update and disseminate information.

(c) A computerized database was developed and analyzed yielding the results contained in the report.

The results of this study will be used as a basis to modify present programs and courses and possibly for the development of a High Technology Institute to offer specialized training, upgrading, or retraining in "High-Tech" fields. The conclusions and recommendations of the project provides valuable information which will translate into improving vocational education in Middlesex County.

MIDDLESEX COUNTY COLLEGE
EDISON, NEW JERSEY 08818

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EDISON, NEW JERSEY 08818

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A. Survey instrument

B. Letter/Survey instrument

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D. Careers in Engineering, Science and Technology - January 18, 1984

E. Conference "Industry and Education: The High Technology Bridge"

F. Mailing List

MIDDLESEX COUNTY COLLEGE
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High Technology Technical Training Needs Assessment

I. PROBLEM

The term "high technology" is to the 1980's what an older word "automation", meant two, three and four decades ago with respect to changes occurring in New Jersey's industrial base. These changes, which have been under way for some time, include the increased use of robots, computer-assisted design, computer-assisted manufacturing, advanced data and word processing systems, sophisticated telecommunications networks and numerical control, to mention the most familiar. In each of these areas, job opportunities are emerging in the design, installation, application and servicing phases, which will at least partially offset the job losses of unskilled and semi-skilled workers.

Representative of the change is the very dramatic example of robotics installations. To respond to the current and future needs for trained technical personnel in the robotics field, the College has established a robotics laboratory to permit the incorporation of robotics into current courses and the establishment of new courses in robotics for our science and engineering technology students. These new facilities will, in addition, permit the College to offer a variety of industrial programs in the principles of robotics; to retrain persons, currently and in the future, who are being replaced by robots; and to offer programs to provide the community-at-large with a robotics awareness.

However, our preliminary survey of the robotics field undertaken for grant, applications and program planning has revealed a dearth of specific, organized, usable knowledge about the actual configuration of robotics-related employment and training in the College's service area. While all involved in the robotics explosion-- manufacturers, users, educators--have evidence of the growing application of robots, no single objective examination has been made of the of the training implication of this development in Middlesex and surrounding counties.

Research in robotics has made us aware of how inadequate the data on high-technology training needs has become. Economic development forecasts may estimate the gross numbers of projected positions in, for example word processing, computer programming or telecommunications, but there is little task-related analysis of what skills, and knowledge will be required in the new jobs to be created. Therefore there was a need for a more in-depth research effort to identify the number, type, and qualifications of people to fill the

technical positions in our area's "high-tech" businesses and industries, so that educational institutions can best use their scarce resources in creating and modifying new programs. At Middlesex, the results of this research will be the development of a High-Technology Institute that will offer specialized training, upgrading or retraining in "high-tech" fields, to supplement existing academic programs in the technologies. Thus, the outcomes of this project will translate into vocational education improvement having, at the very least a county-wide impact.

II. OBJECTIVES

This project had as its objectives the following:

(1) To establish a comprehensive data base for area employers, including the names and positions of managers in charge of training, in-house training capabilities, and sources of external training services.

(2) To identify firms in which there is, or will soon be, a need for retraining or hiring of personnel with skills appropriate to the introduction of high-technology into company activities.

(3) To develop, in cooperation with area employers, a projection of the type and skill level and relative numbers of technical employees to be needed in "high-tech" positions over the next 5 years, together with some idea of industry's training needs in order to prepare individuals for these positions.

(4) To disseminate our findings to cooperating employers at a "High Technology Conference" at which their input into our training strategies will be solicited.

III a. PROCEDURES

A. Definition of High-technology

For the purposes of this study, we developed with the involvement of our Engineering Technology and Science Industrial Advisory Committee, the following definition of high-technology.

High-technology is the state of the art technology which deals with automation and computerization of:

- manufacturing
- data collection
- design and specifications
- laboratory testing
- research and development
- information processing
- instrumentation

B. Development of Sample

A comprehensive list of companies in Middlesex and surrounding counties was developed from the *Middlesex County Industrial Directory* and the *New Jersey State Industrial Directory* as well as from lists provided by the College's Placement and Co-op offices. From that list, a screening committee made up of faculty and administrators from the Engineering Technology and Science Division selected 168 names to receive the survey. Companies were selected on the basis of having 50 or more employees and on the basis of the committee's estimation of how well they fell into the high-tech category. One hundred sixty-eight (168) individuals were selected to receive the survey. Of that group we received returns from fifty-two (52) a total of a 31% response.

Professor David Tyrrell, the Middlesex County College faculty member responsible for the survey, then prepared an initial draft of the survey instrument. This draft was circulated to the appropriate campus offices for comment and after several revisions was prepared for distribution to Industrial Advisory Committee members for evaluation and a trial administration. This review was completed at the December 1983 advisory committee meeting. The suggestions and comments made by the advisory committee members were collected and evaluated and appropriate modifications were made to the survey instrument. The final instrument was then typeset and printed and distributed to the companies selected. A copy of that instrument appears as appendix A of this report. A cover letter signed by Dean Spano (Appendix B) was included with the instrument as was a self addressed stamped envelope.

At the same time, Professor Tyrrell prepared a computerized database-- using *Database Master IV* by Stoneware Inc. on the Apple IIe computer. This database provided a very convenient way to record the incoming data, provide mailing lists and labels, and make the data available for easy analysis. A list of the individuals and companies sampled is included as Appendix C.

IIIb. Characteristics of the Sample

A. End Product or Service

The End products or services of the companies responding varied quite widely, as may be seen in Fig.1. There were, however, concentrations in electrical and electronic manufacturing, biological and pharmaceutical and especially in research and development as might be expected from the nature of the industrial base of Middlesex and its surrounding counties.

[A] - Manufact.-Elect/Electronic - 12.5%
[B] - Manufact.-Computer Equip. - 5.5%
[C] - Manufact.-Mechanical Equip. - 8.3%
[D] - Raw Materials Processing - 5.5%
[E] - Research and Development - 27.8%
[F] - Biological and/or Pharm. - 18.1%
[G] - Municipal Engr./Civil Design - 1.4%
[H] - Construction - 1.4%
[I] - Information (data proc. etc.) - 1.4%
[J] - Other - 16.7%

Fig. 1

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B. Number of Employees

The size of the firms responding to the survey also varied substantially as is shown in Fig. 2. Slightly more than one third of the companies were in the 500 - 1000 employee range, but sizes varied from just over 50 to many thousand employees. These again are quite representative of the sizes of our local employers.

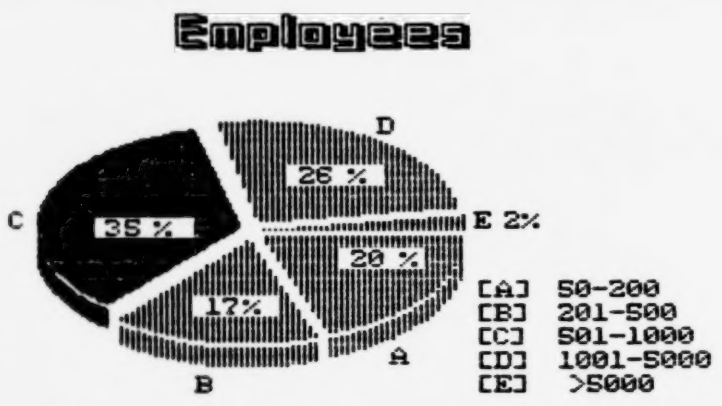

Fig. 2

C. Other Information

Just over fifty percent of the firms responding were headquartered locally, and they had an average of 254 technical and professional staff per company reporting. Figure 3 shows the educational level of the composite professional and technical staff of the corporations reporting.

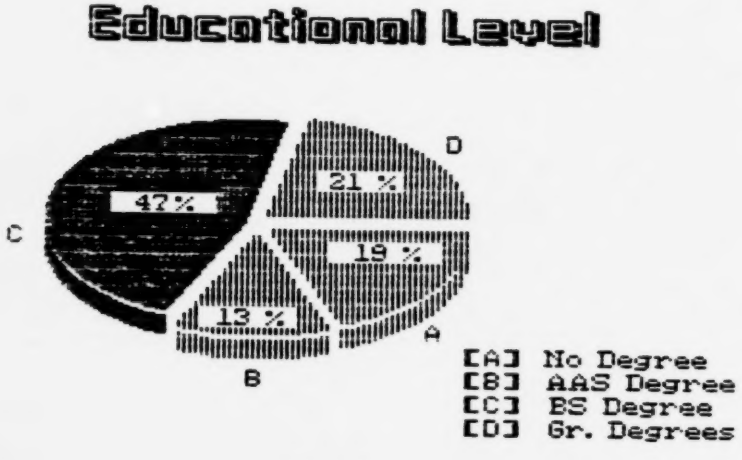

Fig. 3

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It is interesting to note the relatively small segment that have the Associate degree as their highest degree. This probably reflects the relative youth (16 years) of the community college movement in New Jersey, and the fact that many community college graduates go on rather soon to complete a Baccalaureate degree.

Survey respondents were almost without exception personnel officers, responsible engineers or scientists or chief executives of their respective companies.

IV. RESULTS

A. Impact of High-Technology

After the corporate demographics were dispensed with, the first questions asked dealt with the respondents assessment of the impact of high-technology on their company over the next five years. Almost 60 percent estimated that high-technology would have a great or very great impact upon their company (Fig.4). Over 90 percent rated the impact at least moderate.

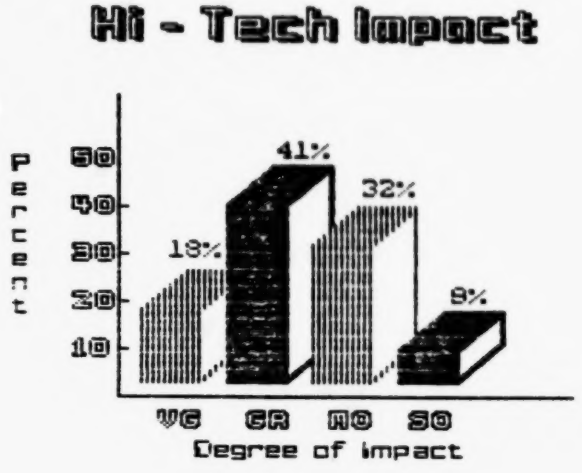
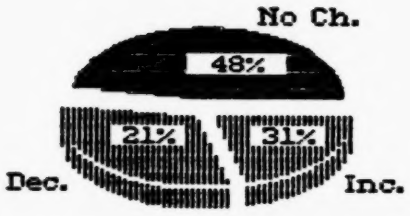


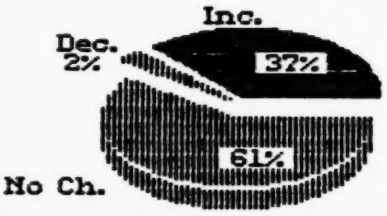
Fig. 4

The second question with regard to impact produced some very interesting and somewhat unexpected results. When asked to estimate the impact of high-technology on employee hires over the next five years, the results shown in Fig. 5 did not project the increase in service related hires nor the decrease in manufacturing related hires that have been so common in the popular press. Further study needs to be done to verify these results, and to determine whether they represent an anomaly for our sample. Almost no one projected a decrease in the hiring of professional/technical staff, a most encouraging result from the college's point of view.

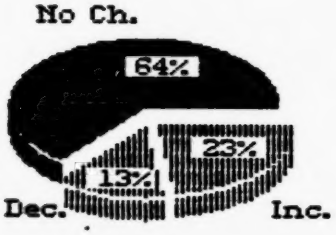
Effect on Employee Hires



Manufacturing



Professional/Technical



Service

Fig. 5

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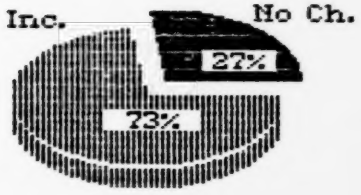
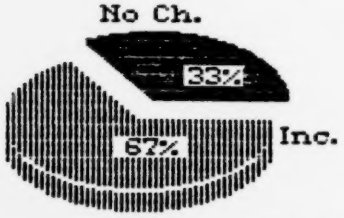
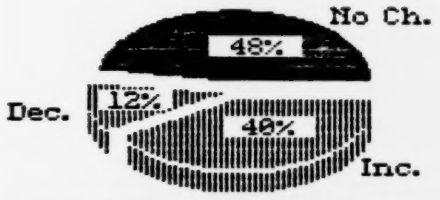
Effect on Education & Skills



Need for Continuing Ed.



Need for Retraining



Entry Level Education & Skills

Fig. 6

Another question asked respondents to assess the impact of high-technology on employee education and skills. As might be expected, substantial majorities of those responding (Fig. 6) projected increases in the need for continuing education for employees currently employed [73%] and for retraining employees for new jobs [67%]. There was some ambivalence however, when they were asked if they foresaw an increase in the entry level education and skills that would be required of new employees. Forty percent thought they would increase but forty-eight percent saw no change and twelve percent foresaw a decrease.

Among the changes in the entry level foreseen included a higher percentage of new hires with baccalaureate and graduate degrees[1], greater technical competence for sales, business and administrative people, and many, many calls for increased facility with computers in applications, as a system and as a control element.

[1] This comment came from the chemical and pharmaceutical industries only.

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Areas of Technical Obsolescence

[A] CAD
[B] Microbiology
[C] Instrumentation
[D] Computer Modeling
[E] Computer Skills
[F] Data Management
[G] Manufacturing Processes
[H] Process Control
[I] Controls
[J] Robotics
[K] Word Processing
[L] Chemistry

Fig. 7

Figure 7 lists the areas of technical obsolescence that the respondents saw as either currently or potentially troublesome. Again it is interesting to note how pervasively the computer in all of its many facets intrudes into this list.

Number of In-house Courses

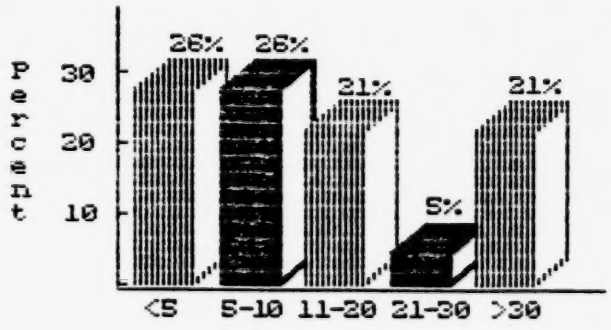

Fig. 8

B. In-house Education and Training

The next series of questions had to do with the company's education and training practices. The respondents were asked to supply us with the name, title, address and phone number of the individual responsible for education and training at that company location. This should be one of the most valuable pieces of information that was gleaned from the survey. Both expansion and continued updating of this list is planned.

Respondents then were asked whether they ran in-house education or training programs at their location. Just over half [52%] responded positively, and were asked to continue to provide more detail on that effort. Figure 8 shows the responses to that question. Less than half indicated that they offered more than ten courses and about three-quarters offered twenty or fewer. Figure 9 shows the types of in-house courses that were offered and indicates the relative frequency with which those areas were mentioned.

Courses Currently Offered

Biological Science	- *******
Business	- **********
Chemical Science	- *********
CIM (Cad/Cam)	- *******
Computers (Hardware)	- **********
Computers (Software)	- ********************
Construction	- *
Electronics	- ****
Instrumentation	- ****
Manufacturing	- ********
Mathematics	- ****
Robotics	- **
Other (Management etc.)	- **********

Fig. 9

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Figure 10 shows the breakdown of reported attendance levels in these in-house courses. Over forty percent [42%] of the companies report greater than thirty percent of their professional/technical staffs were then enrolled in in-house courses.

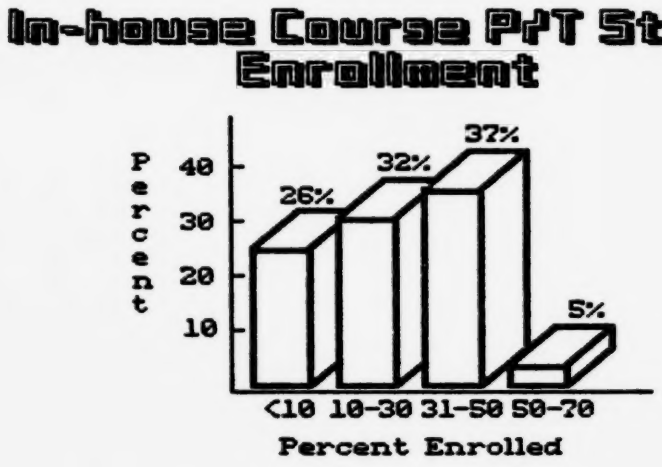
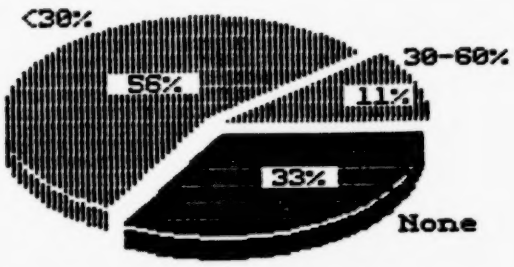


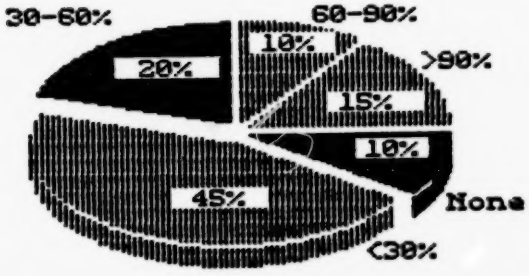
Fig. 10

Two-thirds [67%] of the institutions reporting indicated that some of their instructors for in-house courses were drawn from academic institutions (Fig. 11). Further, only 75% indicated a greater than ninety percent reliance on their own staff as the source for their instructional pool. These figures indicate a widespread acceptance of academic institutions as a source for in-house instruction.

Source of Instructors



Instructors from Academe



Instructors Drawn from Staff

Fig. 11

C. Outside Training Sources

Respondents, whether or not their companies offered in-house educational programs were asked about any programs that they sponsored with outside agencies. Figure 12 shows the percentage of respondents that indicated that their companies sponsored cooperative educational ventures with other companies, government agencies, educational institutions, professional training institutes and professional societies. Seventy-three percent responded that they already cooperated with educational institutions in this respect; a most gratifying figure. But of even greater significance from the point-of-view of the College's future plans are the relatively high percentages of companies jointly sponsoring course with professional training institutes and professional societies. These are precisely the kinds of courses that can be made available through a "High-tech Institute".

Outside Training Sources

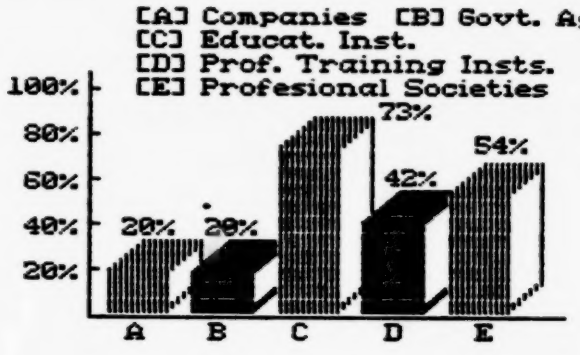


Fig. 12

Substantial numbers of professional and technical staff are currently enrolled in these courses offered in cooperation with outside agencies (Fig.13). However the level of staff involvement is not as great as with in-house courses. If Figures 10 and 13 are compared we see that only about half as many companies [23%] report over that thirty percent of their staff currently enrolled in outside courses as reported the same enrollment levels in in-house programs.

Outside Course P/T Staff Enrollment

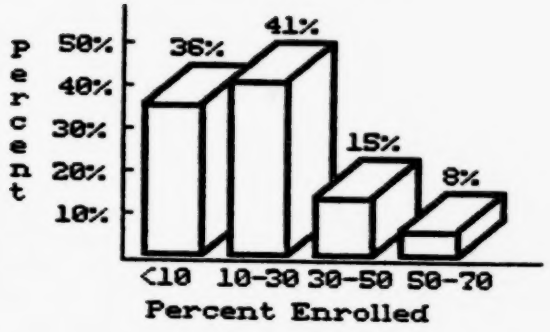


Fig. 13

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Another rather important statistic surfacing from this study is the preference in industry to have courses offered other than at the college itself. Figure 14 shows that about two-thirds [66%] of those responding would prefer at their plant or at some location other than at the college. This makes it very clear that courses offered by a High-tech Institute must be portable to as great an extent as possible. Colleges, for too long, have not grasped this concept. Other educational vendors have.

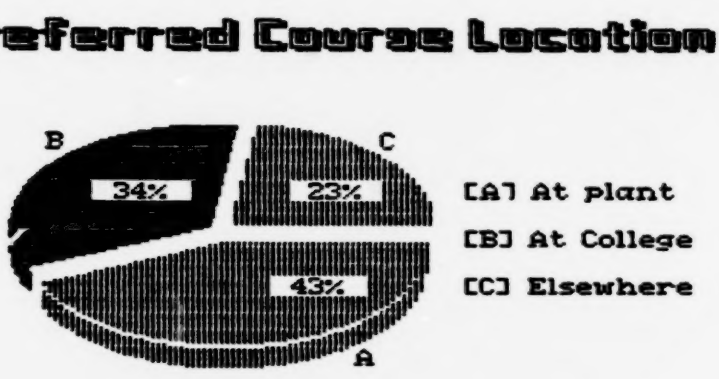

Fig. 14

Another interesting statistic that developed out of the study was that despite corporate security and other proprietary considerations over seventy-five percent of those responding [76%] indicated that they would be willing to participate in training jointly sponsored with other employers. Several that participated in the study felt that the percentage would be substantially smaller than that.

D. Current and Future Training Needs

Fifty-six percent of those responding to the question felt that they currently had unmet educational needs within their companies (Fig. 15). This is a very substantial figure and indicates a very substantial immediate need within business and industry for the kinds of educational services that this college could offer through a high-tech institute. In addition well over eighty percent of those responding foresaw increased need for both continuing education [84%] and for retraining [81%] due to the impact of high-technology on their companies.

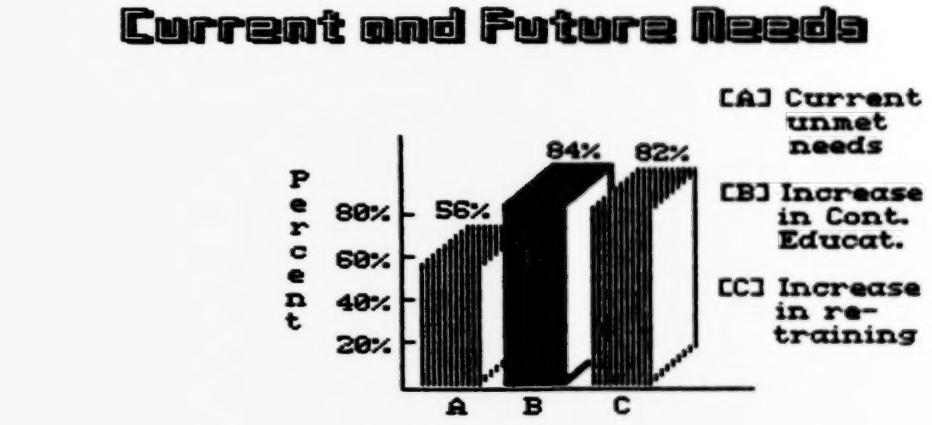

Fig. 15

Finally a list of the expressed current educational needs called out specifically by the respondents is displayed in Figure 16. Many of these items represent areas of expertise already possessed by faculty at the college, all of the expressed needs would be appropriate topics for a response by a High-technology Institute.

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Current Educational Needs

I. Biology
- [A] Botany
- [B] Fermentation
- [C] Plant Physiology
- [D] Lab Techniques
- [E] Automated Instrumentation
- [F] Hybridoma Technology
- [G] Genetic Engineering

II. Chemistry
- [A] Lab Techniques
- [B] H. P. Liquid Chromatography
- [C] Pharmacology

III. Computers
- [A] Computer Literacy
- [B] Systems Integration
- [C] Computer Applications
- [D] Information Systems
- [E] Information Management

IV. Electronics
- [A] IC Design
- [B] Equipment Servicing
- [C] Microelectronics
- [D] Robotics

V. Manufacturing
- [A] N/C Machining
- [B] Machine Oper. Training
- [C] Packaging
- [D] Process Control Systems
- [E] Work Sampling

Fig. 16

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V. CONCLUSIONS

A. According to the survey respondents, high technology will have a substantial impact on our industry. Over 90% of those responding indicated at least a moderate impact. Almost 60% characterize the impact as great or very great.

B. The percentage of professional/technical employees will probably increase over the next 5 years. Over 60 % of those responding expected an increase in these employee categories due to the effects of high technology.

C. Need for continuing education and retraining will both probably increase over the next 5 years. Over 80% of respondents expected increased continuing education and retraining needs.

D. There appears to be a need for higher education to play a significant role in satisfying industry's education and training needs. Only about 50% of the responding industries had in-house educational programs and over half of those offered 10 or fewer courses. Over 70% of the responses indicated that they already offer courses in conjunction with or support students in courses with educational institutions.

E. Industries responding indicated significant current and future training needs. Over 55% indicate current unsatisfied training needs and over 80% project increased need for retraining and continuing education due to High technology.

F. Areas in which there are substantial current and future educational and training needs indicated.

1) Computers - hardware, programing and especially applications training is needed.
2) Robotics, CAD/CAM and CN/C Machining
3) Automated laboratory techniques
4) Information Management

G. High Technology may increase the transfer/placement ratio for our Associate in Applied Science programs. Respondents indicate that it is increasingly important that AAS graduates be able to deal with state-of-the-art technology, be computer literate and acquire the ability to use the computer as a tool.

H. The College must be willing to take education and training opportunities to industry. Over two-thirds of the industries responding indicated a preference for in-plant or other than campus locations for training.

VI. AREAS FOR FUTURE STUDY - RECOMMENDATIONS

Three areas need to be pursued to further extend the results of this study.

A. Correlations between basic corporate demographic information and their high-technology needs should be examined in order to attempt to extend the results of this comparatively modest study to broader industrial communities.

B. Efforts must be expended on the part of Middlesex County College not only to extend this small database but to update it on a regular basis. If the survey were to be replicated on a five-year cycle with regular extension by visits to other appropriate industries between cycles, the usefulness of the database and the reliability of the results would be greatly enhanced.

C. Finally the College should move out with dispatch on the establishment of a High-tech Institute to assist local industry with meeting these challenges that face them over the next several years.

This survey provides a starting point and a base of information for that task. The start should not be wasted.

VII. DISSEMINATION ACTIVITIES PLANNED AND/OR IMPLEMENTED (SEE APPENDIX)

A. Those activities already implemented include:

1. A general meeting of the advisory committee members of the Division of Engineering Technologies and Science was held November 1, 1983. Fifty-five committee members were present to discuss and plan the implementation of this project.

2. A conference was held January 18, 1984 to discuss how students can best be prepared (high school and community college) for the new technologies.

3. A conference "Industry and Education: The High Technology Bridge", was held on May 16, 1984, and attended by 62 people representing education and industry. The conclusions and recommendations of this study were discussed.

4. Over 20 high level management personnel were interviewed by our staff for additional input.

B. Activities Planned

Copies of this report will be mailed to all those appearing on the mailing list included in the appendix. Also, copies will be sent to our Advisory Committee members and to all those who attended the January and May conferences, especially high school guidance counselors.

VIII. Strategies or Activities Employed to Eliminate Sex Bias and Sex Role Sterotyping.

Most of our interviews with industrial personnel were done by our department chairpersons, Dr. Barbara Drescher, Chairperson of the Chemistry Department and Professor Doris Morgan, Chairperson of the Biology Department. This appeared to be very effective in portraying a very positive image of women actively engaged in the field of High Technology.

MIDDLESEX COUNTY COLLEGE, EDISON, NEW JERSEY 08818
Survey of the High-Technology Employment, Continuing Education and Retraining Needs of Central New Jersey Industry

Complete this section ONLY if the label is in error.

Firm _____
Division _____
Address _____
City _____ County _____
State _____ Zip _____ SIC # _____

I. Basic Data

A. Individual responding to questionnaire:
Name _____ Phone _____
Title _____

B. What is the primary end product or service of your firm at this location? (Check the appropriate item(s))

_____ Manufacturing—electrical/electronic equipment or system (except computers)
_____ Manufacturing—computer equipment, system or computer based system
_____ Manufacturing—mechanical equipment or system
_____ Raw Materials Processing (chemicals, petroleum, metals, paper, rubber)
_____ Research and Development
_____ Biological and/or Pharmaceutical
_____ Utilities (communication, electric or gas)
_____ Municipal Engineering/Civil Design
_____ Construction
_____ Information (data processing, publishing etc.)
_____ Other (specify) _____

C. How many employees does your company have at this location?

_____ fewer than 50 _____ 50 - 200 _____ 201 - 500
_____ 501 - 1000 _____ 1001 - 5000 _____ over 5000

D. Is your company headquartered at this location?

_____ Yes _____ No
If *no* where? _____

E. Please estimate the number of employees at this location who are classified as "professional or technical" _____.

F. Please estimate the educational level of your professional and technical staff in terms of percent in each category.

_____ No degree _____ Bachelor's degree
_____ Associate degree _____ Graduate degree(s)

G. If applicable, please name the person in your company responsible for training.
Name _____
Title _____
Address _____ Phone # _____

II. Impact of High-Technology

A. Please estimate the degree of the impact of high-technology on your company over the next five years.

very great	great	moderate	some	none
_____	_____	_____	_____	_____

B. How do you expect high-technology to affect the *kinds* of employees your company hires over the next five years?

	Inc.	Dec.	No Ch.
percent of professional and technical employees	_____	_____	_____
percent of manufacturing employees	_____	_____	_____
percent of service employees	_____	_____	_____
entry level education and skills	_____	_____	_____
employees' need for continuing education	_____	_____	_____
need for employee retraining for a new job	_____	_____	_____

C. In what areas do you anticipate problems with technical obsolescence?

_____ _____ _____ ____ None

III. Education and Training

A. Do you currently have an *in-house* educational program?

____ Yes ____ No (If no, go to B.)

1. Approximately how many courses (programs) are you offering?

<5	5 - 10	11 - 20	21 - 30	>30
_____	_____	_____	_____	_____

2. Please check the fields in which you currently offer training.

____ Biological Science	____ Computers (hardware)	____ Instrumentation
____ Business	____ Computers (software)	____ Manufacturing
____ Chemical Science	____ Construction	____ Mathematics
____ CIM (Cad/Cam)	____ Electronics	____ Robotics

____ Other _____

3. What proportion of your professional and technical staff are currently in these courses?

<10%	10% - 30%	30% - 50%	50% - 70%	>70%
_____	_____	_____	_____	_____

4. Approximately what proportion of your teaching personnel are drawn from your own staff?

none	<30%	30% - 60%	60% - 90%	>90%
_____	_____	_____	_____	_____

5. Approximately what percentage of your teaching personnel are drawn from colleges and universities?

none	<30%	30% - 60%	60% - 90%	>90%
_____	_____	_____	_____	_____

B. Do you offer or support training or development programs in cooperation with other:

1. Companies	____ Yes	____ No
2. Government agencies	____ Yes	____ No
3. Educational institutions	____ Yes	____ No
4. Professional Training Inst's.	____ Yes	____ No
5. Professional Societies	____ Yes	____ No

C. What proportion of your current professional/technical staff have enrolled in one of these courses during the last year?

<10%	10% - 30%	30% - 50%	50% - 70%	>70%

D. What current educational needs do you have that are not now being met?

E. Where would you prefer to have courses offered?

_____ at your plant _____ at a college

_____ elsewhere _____

F. Would you participate with other employers in a cooperative effort?

_____ Yes _____ No

G. In what areas do you foresee an increased need for continuing education due to high-technology?

H. In what areas do you foresee an increased need for retraining of employees due to high-technology?

I. What changes do you foresee in the entry level educational qualifications necessary for future employees due to high-technology?

J. In what areas would you like Middlesex County College to assist you with some of your training requirements?

K. Any further comments.

Middlesex County College

EDISON, NEW JERSEY 08818 (201) 548-6000

February 27, 1984

Mr. P. Kramer, President
Amerada Hess Corp.
1 Hess Plaza
Woodbridge, NJ 07095

Dear Mr. Kramer:

The term "HIGH TECHNOLOGY" seems to grab the ear of everyone. Some say that we are on the verge of a new industrial revolution. Few agree on a definition for it. Mystery shrouds it, and it has become the byword of economic politics.

In order for Middlesex County College to more clearly understand the impact that "HIGH TECHNOLOGY" is having on the educational and training needs of our industrial community, I ask you to take a few minutes of your very valuable time to complete the enclosed survey on your current and future employment, continuing education, and retraining needs. Your information WILL guide us in preparing Middlesex County College and its programs to better meet your needs in these areas; to graduate technical personnel more suited to your jobs; to offer the specialized continuing education and retraining needed by your employees.

For the purpose of this study, we are defining High Technology to be the state of the art technology which deals with:

automation and computerization of
- manufacturing
- data collection
- design and specifications
- laboratory testing
- research and development
- information processing
- instrumentation

This research project is funded by the N.J. Department of Education, Division of Vocational Education. Your response will be kept completely confidential and data will be reported anonymously and only as part of grouped data. We will host a conference in May to disseminate the findings and you will be invited to attend.

Thank you for your cooperation in this effort.

Sincerely yours,

F. Spano

Francis A. Spano, Ph.D.
Dean, Division of Engineering Technologies & Science

Enclosure

P.S. Please return the questionnaire no later than MARCH 15, 1984.

Middlesex County College

EDISON, NEW JERSEY 08818 (201) 548-6000

TO: Advisory Committee Members
Division of Engineering Technologies & Science

We are continuously grateful and appreciative of the assistance you have granted us in the development of excellent programs and in maintaining their relevancy to the "real world". Our cooperative efforts have resulted in many successful programs, which reflect many of your suggestions and recommendations.

With the introduction of "high technology" changes in many industries, we will be even more dependent on your expertise and knowledge. In this regard we must ask of you more time and effort than before in assisting us in a research project just recently granted us by the Department of Higher Education.

The grant to our Division of Engineering Technologies and Science calls for an in-depth research effort that will identify the number, type and qualifications required for technical positions in Middlesex County and surrounding areas "high tech" businesses and industries. Thus, this acquired data and its analysis would provide essential information so that our college can best utilize its resources in implementing program modifications and additions, and may ultimately provide the basis for the development of a High Technology Institute, envisioned to offer specialized training, upgrading, or retraining in "high tech" fields supplementing our existing academic programs in the technologies.

In order to organize our efforts, we are calling for a meeting of our Advisory Committee on

Tuesday, November 1, 1983

Corral Lounge, College Center

Middlesex County College

4:00-7:00 pm Dinner Meeting

Our Agenda will include:

1. Defining high technology (from your perspective and your position in your company - what is high technology? what clusters of technologies would this definition encompass?)

2. Exploring the impact of "high tech" on your company: What is expected in the near future?

3. Predicting the number of "high tech" positions: Will there be an increase in jobs? In what areas?

4. Determining the minimum level of training expected as entry into those "high tech" jobs? What additional training must be added to present technical programs?

5. Determining the nature of retraining present personnel for those "high tech" positions.

6. Obtaining from you the name, title, address of your co-workers in charge of training personnel and others at executive levels whom you feel might be able to assist us. Specifically, we must have the name, etc of your training manager.

7. Discussing our draft questionnaire (to be sent to you under separate cover).

Please invite to our meeting any of your colleagues (item 6) interested in attending and come prepared to discuss the above agenda items. It would be greatly appreciated if you would bring written replies to the above to facilitate our discussions.

We are looking forward to seeing you and eagerly await your input. If you are unable to attend, it is urgent that you reply to the agenda items by mail to arrive prior to November 1, 1983.

As always, we greatly appreciate your assistance.

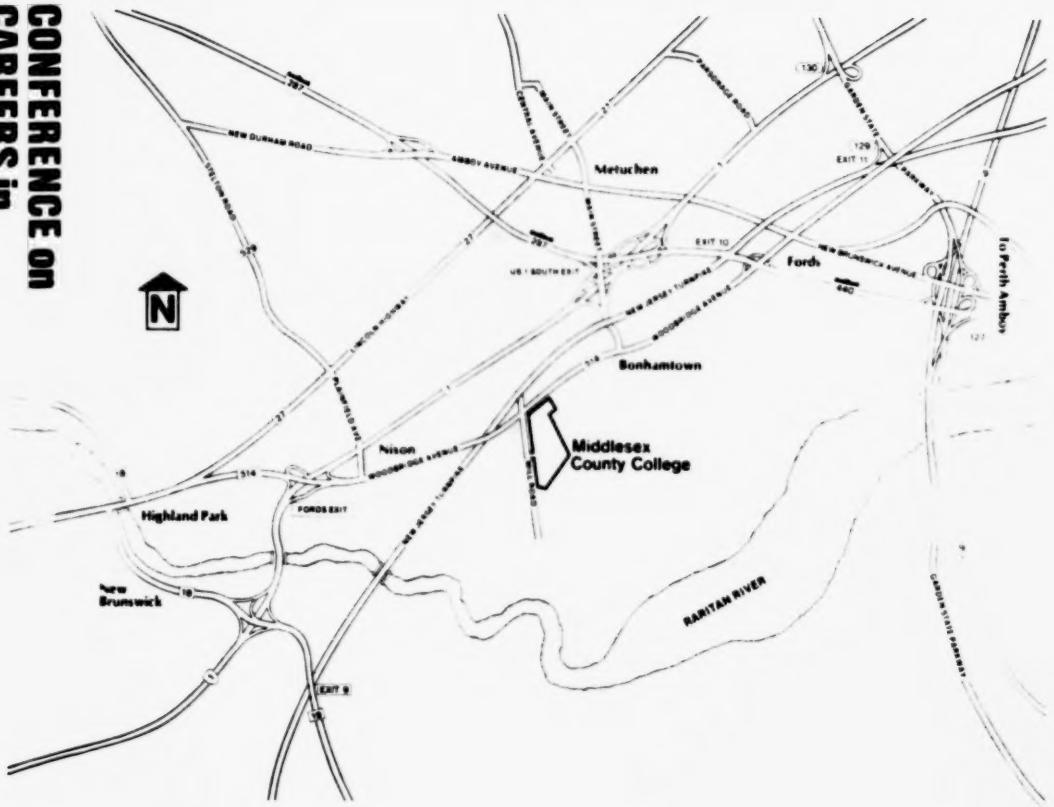
Sincerely,

Francis A. Spano, Ph.D.
Dean
Division of Engineering Technologies & Science

FAS/nw

CONFERENCE on CAREERS in ENGINEERING, SCIENCE, and TECHNOLOGY

Wednesday January 18, 1984



Middlesex County College
Division of Engineering Technologies and Science
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APPENDIX D

E=MCC

CAREERS in ENGINEERING, SCIENCE, and TECHNOLOGY

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CONFERENCE on CAREERS in ENGINEERING, SCIENCE, and TECHNOLOGY

Wednesday January 18, 1984

You are cordially invited to attend a one-day conference on Careers in Engineering, Science, and Technology at Middlesex County College, Edison, New Jersey, on Wednesday, January 18, 1984.

Representatives from leading national and local industries will provide valuable information about careers in their area, as well as what lies ahead for your students and what kind of preparation they will need for future success.

A comprehensive **Careers** booklet will be distributed. Specific careers are outlined, including job descriptions, salary ranges, and course requirements.

To register, please complete the form below and return it no later than December 14, 1983.

For more information, phone (201)548-6000, extension 473.

REGISTRATION FORM

Return to: Professor A. Azzolino
Mathematics Department, Center II
Middlesex County College
Edison, NJ 08818

Please duplicate this form for additional registration.

Name _____

School _____

Address _____

_____ Zip _____

School Phone Number _____

Are you interested in a tour of the campus? _____

CONFERENCE PROGRAM

8:30- 9:15 a.m.
Coffee and Registration
in the College Center

9:15- 9:30 a.m.
Welcome
Dr. Rose M. Channing, President
Middlesex County College

Dr. Francis Spano, Dean
Division of Engineering
Technologies and Science

9:30-10:00 a.m.
Keynote Speaker

10:10-11:10 a.m.
Careers in Engineering and
Engineering Technology

11:20-12:20 p.m.
Careers in Biology, Chemistry,
and Environmental Technology

12:30- 1:30 p.m.
Complimentary Luncheon

1:35- 2:35 p.m.
Careers in Computer Science,
Mathematics, and Physics

2:40 p.m.
Distribution of **Careers**
booklet

Campus tour available

Sponsored by the Division of Engineering Technologies and Science, Middlesex County College and by a grant, "High Technology Technical Training Needs Assessment," funded by the New Jersey Department of Education, Division of Vocational Education.

Appendix E

"INDUSTRY AND EDUCATION: THE HIGH TECHNOLOGY BRIDGE"

MIDDLESEX COUNTY COLLEGE CONFERENCE

MAY 16, 1984

COLLEGE CENTER

9:30 am - 10:00 am Registration and Coffee

10:00 am - Dr. Rose Channing, President, Middlesex County College

10:15 am - Mr. John Bakum, V.P. Academic & Student Affairs

10:30 am - Mr. Douglas Opalski, Guest Speaker, Director of County Planning, Middlesex County

10:45 am - Dr. F. Spano, Dean, Division of Engineering Technologies and Science
Review of High Technology Needs Assessment Research Grant.

11:00 am - Mr. David Tyrrell, Professor of Electrical Engineering Technology
Discussion of Grant Analysis and impact on the needs for High Technology personnel.

12:00 Noon - 1:30 pm LUNCH

Guest Speaker, C.A.R. Kagan, AT&T Technology Research Center

1:30 pm - 3:30 pm High Tech Institute Panel

Moderator - Prof. John Dineen, Chairman, Computer Science
Prof. Lloyd Kalugin, Director, Coop Education
Middlesex County College
Mr. Robert Jenkins, Manager of Technical Services, IBM
Mr. Armond Commarota, Director, Advanced Learning Systems, Sperry

3:30 pm Closing Remarks, Dr. Frank A. Spano

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APPENDIX F - HIGH TECH MAILING LIST

Patricia Bowman Manager
Personal Products Co.
Milltown New Jersey

Elio Mendilo Personnel Manager
General Dynamics Corp.
Electro Dynamic Div.
150 Avenel St.
Avenel New Jersey 07001

Crawford Scott Personnel Manager
Reynolds Metals Co.
433 Blair Rd., Box 100
Avenel New Jersey 07001

William Hansen Personnel Manager
Engelhard Industries
Engelhard Minerals & Chemicals
700 Bl.. Rd.
Carteret New Jersey 07008

Edward J. Guididas Personnel Manager
F M C Corp.
Phosphorus Chemicals Div.
500 Roosevelt Ave.
Carteret New Jersey 07008

S. Pearl President
Kappa Networks Inc.
165 Roosevelt Ave.
Carteret New Jersey 07008

R. J. M. Fisher President
The Singer Co.
Singer-Climate Control Div.
1300 Federal Blvd.
Carteret New Jersey 07008

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U.S. Metals Refining
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Accurate Bushing Co.
443 North Avenue
Garwood New Jersey 07027

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National Tool & Mfg
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Ga Assembly Division
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Plainfield New Jersey 07060

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Howell Products Inc.
900 North Avenue
Plainfield New Jersey 07061

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Signal Stat
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Med Division
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Alcan Ingot & Powders
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Summit Avenue New Jersey 07091

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Emerson Quiet Kool Corp.
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Woodbridge New Jersey 07095

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Constantine Kallas President
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Ariston Inc.
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Hillside New Jersey 07205

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Elizabeth New Jersey 07207

Joseph E. D'Elia Chief Engineer
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Bristol-Myers Products
225 Long Avenue
Hillside New Jersey 07207

Carl Larbieu Chief Engineer
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Union New Jersey 07083

H. Meyer Chief Engineer
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Dyes & Pigments Division
P. O. Box 385
Union New Jersey 07083

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McGraw-Edison Co.
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Mountainside New Jersey 07092

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Cranford New Jersey 07016

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Elizabeth New Jersey 07202

B. Dorn, Jr. Chief Engineer
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Michael Dills Sup.of Employment & Training
FMC Corporation
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Patricia Sohor Manager
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Wallace K. Grubman President
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N J E
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Edison New Jersey 08817

D.E. Petersen President
Ford Motor Co.
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Edison New Jersey 08817

Bettie Calise Personnel Manager
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Opcoa Div.
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Edison New Jersey 08817

Wayne P. Wilson Personnel Manager
Mattel Inc.
Standard Plastic Products Inc.
1 Truman Dr. S
Edison New Jersey 08817

Roy Gelber President
Model Rectifier Corp.
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Meyer Sapoff President
Thermometrics Inc.
808 U S Hwy. 1
Edison New Jersey 08817

R.D. Sansone President
Wadell Equipment Co.
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P.D. Lewthwaite Personnnel Manager
White Consolidated Ind
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